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(54) 【発明の名称】 空気入りラジアルタイヤ及びその製造方法

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### (57) 【要約】

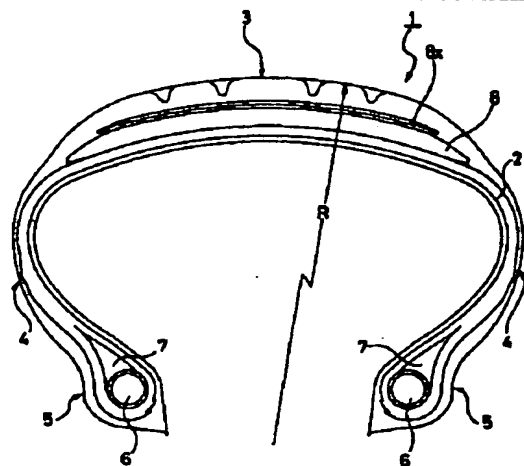
【課題】 所謂「つづら折り」ベルト構造において、一層の高速耐久性を向上可能にした空気入りラジアルタイヤ及びその製造方法を提供すること。

【解決手段】 複数本のコード11からなるストリップ材12を両ショルダー端部6でジグザグ状に折り返ししながらタイヤ周方向に巻回したベルト層8をトレッド部3に設けた空気入りラジアルタイヤにおいて、ストリップ材12の長手方向に直交する方向のコード密度を、ショルダー端部9で密にするとともに、センター部10に向かうに従ってショルダー端部9よりも疎にした。

【産業上の利用分野】 本発明は、空気入りラジアルタイヤ及びその製造方法に関し、さらに詳しくは高速耐久性に優れ、特に航空機用ラジアルタイヤに好適な空気入りラジアルタイヤ及びその製造方法に関する。

### 【特許請求の範囲】

【請求項1】 複数本のコードからなるストリップ材を両ショルダー端部でジグザグ状に折り返ししながらタイヤ周方向に巻回したベルト層をトレッド部に設けた空気入りラジアルタイヤにおいて、前記ストリップ材の長手方向に直交する方向のコード密度を、前記ショルダー端部で密にするとともに、センター部に向かうに従って前記ショルダー端部よりも疎にした空気入りラジアルタイヤ



【請求項2】 前記トレッド部のトレッドラジアスが200～300mmである請求項1に記載の空気入りラジアルタイヤ。

【請求項3】 最高空気圧を充填して規定荷重を負荷したときに静止状態で形成される接地面において、センター部の接地長さ (Lc) と接地幅の80%の位置における接地長さ (Ls) との比 (Ls/Lc) が、0.75～0.85の範囲である請求項1または2に記載の空気入りラジアルタイヤ。

【請求項4】 前記空気入りラジアルタイヤが航空機用ラジアルタイヤである請求項1、2または3に記載の空気入りラジアルタイヤ。

【請求項5】 複数本のコードからなるストリップ材をベルト成形ドラムの軸方向に往復移動させながら、該ベルト成形ドラム上にドラム周方向にジグザグ状に巻回して空気入りラジアルタイヤのベルト層を形成するに当たり、1乃至2本を単位として供給するコード供給部を前記ベルト成形ドラムの軸方向に互いに独立に往復移動するように複数配置し、これら複数のコード供給部を前記

ベルト成形ドラムの両端部では互いに近接させ、センター部では互いに離間させるように移動させることにより、前記複数本のコードからなるストリップ材を前記両端部で密にするとともに、前記センター部に向かうに従って前記両端部より疎になるようにして前記ベルト層を形成する空気入りラジアルタイヤの製造方法。

【請求項6】 前記センター部と両端部の周長の差が30～150mmのベルト成形ドラムを用いて前記ベルト層を形成する請求項5に記載の空気入りラジアルタイヤの製造方法。

#### 【図面の簡単な説明】

【図1】 本発明の一実施形態を示す空気入りラジアルタイヤの子午線断面図である。

【図2】 図1の空気入りラジアルタイヤのベルト層の一部を示す展開図である。

【図3】 図1の空気入りラジアルタイヤの接地面を説明する図である。

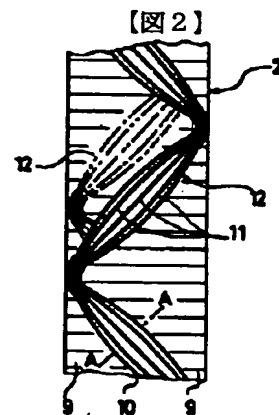
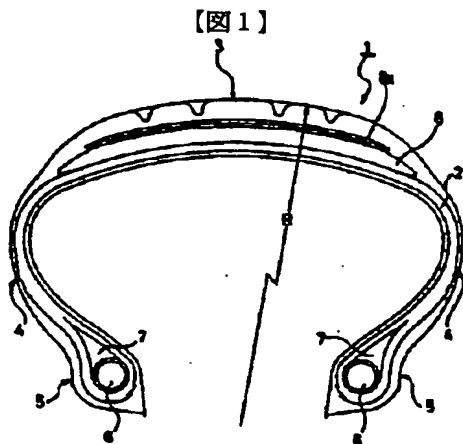
【図4】 図3の接地面の中央部と周辺部の接地圧と荷重との関係を示すグラフである。

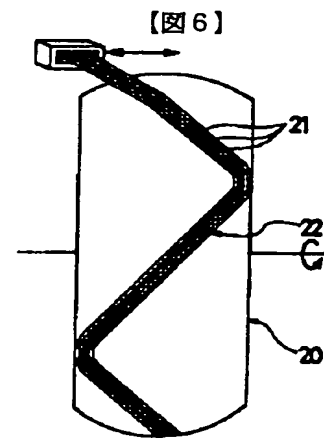
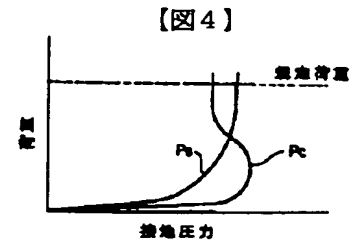
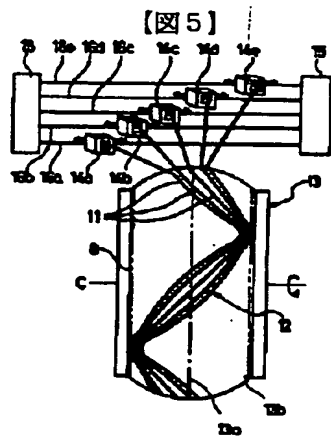
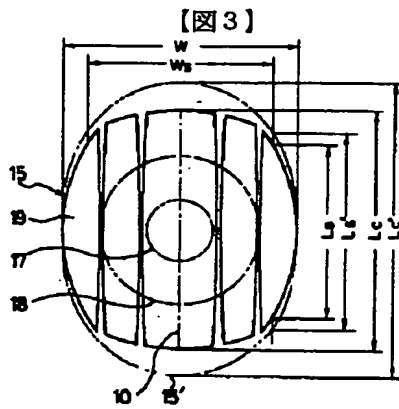
【図5】 本発明の空気入りラジアルタイヤの製造方法におけるベルト層の成形工程を示す説明図である。

【図6】 従来の航空機用ラジアルタイヤのベルト層の成形装置を示す説明図である。

#### 【符号の説明】

- 1 航空機用ラジアルタイヤ
- 8 ベルト層
- 9 ショルダー端部
- 10 センター部
- 11 コード
- 12 ストリップ材
- 13 ベルト成形ドラム
- 14 a～14 e コード供給部
- 15 接地面
- W 接地幅
- Ws 80%接地幅
- Lc センター部の接地長さ
- Ls 80%接地幅における接地長さ





【第1ページ書誌事項の続き】

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1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.\*\*\*\* shows the word which can not be translated.

3.In the drawings, any words are not translated.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] About the radial-ply tire containing air, and its manufacture approach, in more detail, this invention is excellent in high-speed endurance, and relates to the suitable radial-ply tire containing air especially for the radial-ply tire for aircrafts, and its manufacture approach.

[0002]

[Description of the Prior Art] Conventionally, as shown in drawing 6 , the so-called "winding path" belt structure which winds around a tire hoop direction by return the strip material 22 to which rubberizing of two or more codes 21 was arranged [ they lengthened them and ] and carried out in the shape of zigzag in a flat surface at the both ends of the belt layer 20 while is used for the belt layer of the radial-ply tire containing air for aircrafts.

[0003] The belt layer 20 made into "winding path" structure has the advantage which makes effective width large since it does not have the amputation stump end of a code in both ends, and enlarges the reinforcement effectiveness. However, since it was made double width, the \*\*\*\* riser of both the shoulder section at the time of high-speed rotation was large, and this \*\*\*\* riser tended to start separation with rubber, and caused [ of high-speed endurance ] a fall.

[0004] Moreover, from a viewpoint on manufacture, in order to make the strip material 22 crooked in a flat surface, it is hard to turn at the strip material 22, and it becomes easy to produce a relief in the flection 22a. And the radial-ply tire containing air for aircrafts had become a lifting and a cause of a cone about separation further, in order that the amount of lifts of the tread pin center,large section might become remarkably large compared with the shoulder section and this might enlarge the relief in the above-mentioned flection further, in case a lift was hung within metal mold at the time of vulcanization shaping of the Green tire, since tread RAJIASU is as small as about 200-300mm.

[0005]

[Problem(s) to be Solved by the Invention] The purpose of this invention is in the radial-ply tire containing air which has the so-called "winding path" belt structure to offer the radial-ply tire containing air which enabled improvement of much more high-speed endurance, and its manufacture approach.

[0006]

[Means for Solving the Problem] The radial-ply tire containing air of this invention which solves the above-mentioned technical problem In the radial-ply tire containing air which prepared the belt layer which wound around the shape of zigzag by return the strip material which consists of two or more codes at both the shoulder edge in the tire hoop direction while in the tread section It is characterized by making into a non-dense code density of the direction which intersects perpendicularly with the longitudinal direction of said strip material rather than said shoulder edge as it went to the pin center,large section while making it dense at said shoulder edge.

[0007] Since in fabricating "winding path" belt structure from the strip material which consists of two or more codes according to this invention code density of the direction which intersects perpendicularly with the longitudinal direction of strip material was made dense at the shoulder edge, and it was made

the non-dense rather than the shoulder edge as it went to the pin center, large section, the rigidity in the shoulder section of strip material becomes high, and the \*\*\*\* riser of the shoulder section at the time of high-speed rotation can be controlled. Moreover, since code spacing was extended and it was made the non-dense so that code density was gone to the pin center, large section, a belt layer edge can rise, the whole tread can be made to be able to distribute the force, and the reinforcement effectiveness over a tread can be increased further.

[0008] Moreover, the manufacture approach of the radial-ply tire containing air of this invention Making the shaft orientations of a belt shaping drum carry out both-way migration of the strip material which consists of two or more codes In winding around this belt shaping drum lifting in the shape of zigzag in a drum hoop direction, and forming the belt layer of the radial-ply tire containing air More than one are arranged so that both-way migration of the code feed zone which supplies 1 thru/or 2 as a unit may be carried out mutually-independent to the shaft orientations of said belt shaping drum. While making dense said strip material which consists of a code of a book at said both ends by making the code feed zone of these plurality approach mutually at the both ends of said belt shaping drum, and making it move so that it may be made to estrange mutually in the pin center, large section It is characterized by forming said belt layer from said both ends, as it becomes a non-dense as it goes to said pin center, large section.

[0009] According to the manufacture approach of this invention, the code feed zone of two or more codes which constitute strip material Making it move so that plurality may be made to become independent for every 1-2 unit, the code feed zone of these plurality may be made to approach mutually at the both ends of a belt shaping drum and it may be made to estrange in the pin center, large section Since it was made smaller than both ends as it went to the pin center, large section, while enlarging code density of the direction which intersects perpendicularly with the longitudinal direction of strip material at both ends While making easy crookedness of the strip material in both ends, the lift of the pin center, large section at the time of hanging a lift within metal mold at the time of vulcanization shaping of the Green tire can be made easy, and the relief of the flection of the strip material in the shoulder section can be prevented. Therefore, the \*\*\*\* riser of the belt layer both ends at the time of high-speed rotation can be controlled, and endurance can be improved.

[0010]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained using drawing.

[0011] Drawing 1 is a meridian sectional view of radial TAIA for aircrafts which consists of an operation gestalt of this invention. It is the description that compare this aircraft tire 1 for [ general ] cars, and tread RAJIASU R of the tread section 3 is formed comparatively small and broadly with 200-300mm. The carcass layer 2 consists of two or more plies, it is arranged so that it may result in a toe of bead 5 through the side section 4 on either side in the tire inside from the tread section 3, and it is turned up so that both ends may wrap in a bead filler 7 around the bead core 6 further. The belt layer 8 which consists of a textile code is arranged at the periphery side in the tread section 3 of this carcass layer 2. Furthermore, belt-cover layer (belt protective layer) 8x which come to arrange a textile code to a hoop direction are arranged at the periphery side of the belt layer 8.

[0012] The belt layer 8 has "winding path" belt structure wound around the tire hoop direction in the shape of zigzag, being turned up so that the strip material 12 which consists of two or more codes (drawing 5) 11 may be crooked in a flat surface at the shoulder edge 9 of both sides, as shown in drawing 2 . And between the codes 11 which adjoin each other as the code 11 of the strip material 12 contacts mutually and goes to the pin center, large section 10 at both the shoulder edge 9 of the tread section estranges mutually, maintaining this "winding path" structure. Therefore, the code density of direction A-A which intersects perpendicularly with the longitudinal direction of this strip material 12 serves as max at the shoulder edge 9, and serves as min in the pin center, large section 10.

[0013] The radial-ply tire 1 for aircrafts which has such a belt layer 8 has the high code density of the strip material 12 at the shoulder edge 9, and since it has high rigidity, the both ends of the belt layer 8 at the time of high-speed rotation can rise, and it can control a phenomenon. Moreover, since the code 11

of the strip material 12 separates mutually in the pin center, large section 10, code density has become a non-dense, the edge of the belt layer 8 rises and the whole tread section 3 is made to distribute the force widely, high-speed endurance can be improved.

[0014] travelling direction touch-down length [ in / on the ground plane 15 especially shown in drawing 3 by this invention, and / in the touch-down length of the travelling direction of the pin center, large section 10 / the location of 80% of width of face  $W_s$  of  $L_c$  and the touch-down width of face  $W$  ] -- a ratio with  $L_s$  -- it is desirable that the range of  $L_s/L_c$  is 0.75-0.85.

[0015] Here, a ground plane 15 is a ground plane formed by the quiescent state, when it is filled up with the highest pneumatic pressure specified on the aircraft yearbook (Aircraft Year Book) of the version in the 1997 fiscal year of TRA (Tire and Rim Association) issue and the load of the convention load is carried out. Moreover, when  $L_c$  and  $L_s$  do not have a rib in each location in the touch-down length of a travelling direction, it is the die length of the latest rib.

[0016] As the relation between the ground pressure force of the center section 17 directly under a load and the annular periphery 18 around it of a ground plane 15 and a load is shown in drawing 4, when the load by which a load is carried out is large, the ground pressure  $P_s$  of a periphery 18 becomes large from the ground pressure  $P_c$  of a center section 17. If a difference with this ground pressure  $P_c$  and  $P_s$  is large, since change of the ground pressure of the tread section will become large at the time of tire rolling, high-speed endurance falls.

[0017] The difference with this ground pressure  $P_c$  and  $P_s$  will become larger than the ground plane 15 shown as a continuous line, if  $L_s/L_c$  becomes small like ground-plane 15' shown with the chain line all over drawing. Therefore, by making  $L_s/L_c$  or more into 0.75, the difference of the ground pressure of a center section 17 and a periphery 18 is made small, and it becomes possible to improve high-speed endurance.

[0018] Moreover, since growth of the diameter of the pin center, large section 10 at the time of high-speed rotation will become large and repeat deformation of the tread section at the time of tire rolling will become large even if it carried shoulder section 19 by the belt layer 8 of winding path structure and has controlled \*\*\*\*\* if  $L_s/L_c$  is smaller than 0.75, high-speed endurance tends to fall.

[0019] On the other hand, if  $L_s/L_c$  is larger than 0.85, since the ground pressure of the shoulder section 19 will become large compared with the ground pressure of the pin center, large section 10 in a ground plane 15, the endurance of the shoulder section falls.

[0020] Next, the manufacture approach of the above radial-ply tire tires for aircrafts is explained.

[0021] the belt shaping drum 13 which fabricates the belt layer 8 as shown in drawing 5 -- the difference of the perimeter of pin center, large section 13a of the peripheral face, and both-ends 13b -- 30-150mm -- it is -- tread RAJIASU R of a tire, and abbreviation -- it is the profile drum which has the same curvature, and a rotation drive is carried out a core [ a revolving shaft C ].

[0022] On the other hand, to this belt shaping drum 13, two or more code feed zones 14a-14e are arranged so that the textile code 11 may be supplied in 1 thru/or two units, respectively and one strip material 12 may be formed. these code feed zones 14a-14e are supported to the linear guides 16a-16e respectively parallel to the revolving shaft C of a belt shaping drum -- having -- a driving gear 15 -- mutually-independent -- a round trip -- it is movable.

[0023] In order to fabricate the belt layer 8 using the above-mentioned equipment, while rotating the belt shaping drum 13, a code 11 is twisted around the peripheral face from the code feed zones 14a-14e, respectively, supplying so that the strip material 12 may be formed. while this code 11 that will form the strip material 12 if both-way migration is carried out so that it may be made to estrange so mutually that it twist, each code feed zones 14a-14e made to approach mutually at the shaft-orientations both ends of the belt shaping drum 13 in actuation and it go to the pin-center, large section converges on a contiguity condition mutually at both ends -- being crooked -- moreover -- the pin-center, large section 10 -- mutual -- alienation -- it is wound around the hoop direction of a belt shaping drum 13 in the shape of zigzag, being in a condition. Therefore, while the code density of the direction which intersects perpendicularly with the longitudinal direction of the strip material 12 becomes dense at both ends, the belt layer 8 which became a non-dense from both ends is fabricated as it goes to the pin center, large section.

[0024] Thus, the obtained belt layer 8 fabricates the Green tire by attaching to the tread section periphery side of the tire rest separately fabricated by the well-known approach, and the radial-ply tire for aircrafts as shown in drawing 1 is obtained by [ the ] carrying out after-cure shaping.

[0025] Since according to the tire manufacture approach mentioned above both-way migration of the code feed zones 14a-14e which form the strip material 12 was carried out mutually-independent, and it is made to approach mutually at the both ends of the belt shaping drum 13 and was made to make code density dense, crookedness of the strip material 12 in both ends can be made easy, and, moreover, the relief of a flection can also be prevented.

[0026] Moreover, since code density of the strip material 12 is made into the non-dense rather than the shoulder section in the pin center,large section, even if it is the case where vulcanization shaping of the Green tire of the comparatively small tire of tread RAJIASU is carried out like an aircraft tire, a lift can be made easy to make small resistance to the lift of the pin center,large section with many amounts of lifts, and to carry out, and the relief of the flection of the strip material at the time of a lift can be prevented. Therefore, distortion of belt layer both ends can be lessened, and high-speed endurance can be improved further.

[0027] In addition, although the code feed zones 14a-14e were constituted from an operation gestalt of illustration as the special structure, you may make it a respectively simple both-way migration guide.

[0028] In this invention, it is the description to make it dense in the location of a shoulder edge, and to make it the forge-fire non-dense toward the pin center,large section, and, as for the code density of strip material, it is desirable to change code density corresponding to the ratio of the perimeter of the shoulder edge of a tire and the pin center,large section, and to constitute. For example, what set the ratio ( $D_c/D_s$ ) of the code density ( $D_c$ ) of the pin center,large section of strip material and the code density ( $D_s$ ) of the shoulder section as the range of 0.94-0.97 is desirable.

[0029]

[Effect of the Invention] As a detailed explanation, above with the radial-ply tire containing air of this invention In the belt layer which wound around the shape of zigzag by return the strip material which consists of two or more codes at both the shoulder edge in the tire hoop direction while While making dense code density of the direction which intersects perpendicularly with the longitudinal direction of strip material at the shoulder edge Since it was made the non-dense rather than the shoulder edge as it went to the pin center,large section, the rigidity in the shoulder section becomes high. The \*\*\*\* riser of the shoulder section at the time of high-speed rotation can be controlled, and a belt layer edge can rise, the whole tread can be made to be able to distribute the force, the reinforcement effectiveness over a tread can be increased further, and high-speed endurance can be improved.

[0030] Moreover, it hits according to the manufacture approach of the radial-ply tire containing air of this invention, winding around belt shaping drum lifting the strip material which consists of two or more codes in the shape of zigzag, and fabricating the belt layer of the radial-ply tire containing air. More than one are arranged so that both-way migration of the code feed zone which supplies 1 thru/or 2 as a unit may be carried out mutually-independent to the shaft orientations of a belt shaping drum. By approaching mutually at the both ends of a belt shaping drum, and making it move so that it may estrange mutually in the pin center,large section Since a belt layer is fabricated so that it may become a non-dense from both ends as it goes to the pin center,large section, while making dense the strip material which consists of two or more codes at both ends While making easy crookedness in the both ends of strip material, the lift of the pin center,large section at the time of hanging a lift within metal mold at the time of vulcanization shaping of the Green tire is made easy. The relief of the flection of the strip material in the shoulder section can be prevented, the \*\*\*\* riser of the belt both ends at the time of high-speed rotation can be controlled, and high-speed endurance can be improved.

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[Translation done.]

